The Catalogue of Quaternary Volcanoes of the Greater Caucasus Based on Geochronological, Volcanological and Isotope-Geochemical Data

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Abstract—A catalogue of Quaternary volcanoes of the Greater Caucasus has been compiled based on recent geological, petrological-geochemical and isotope-geochronological data obtained in the last decades. This catalogue provides insight into the evolution of the youngest magmatism in this part of the Alpine-Himalayan fold belt at the modern level of knowledge. The catalogue is given as a set of tabular data on 74 volcanic edifices that have been found and described in literature in varying detail, including their coordinates, absolute height, type of edifice and the predominant type of eruption, age, as well as main petrographic, isotope-geochemical characteristics, and the chemical composition of the products of magmatic activity. For the sake of convenience, the volcanoes of the Kazbek and Elbrus neovolcanic areas representing two main areals of young magmatism at the Greater Caucasus are described separately. In addition, data on the Kazbek area are grouped by traditionally distinguished volcanic centers. Text presents general information on the Quaternary volcanic activity within the Greater Caucasus, its geochronology, spatiotemporal distribution, and petrogenesis of the youngest volcanic rocks.

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INTRODUCTION

The Greater Caucasus is the only region in European Russia which revealed intense Quaternary (youngest) volcanic activity. Although centers of young magmatism in this part of the Alpine-Himalayan fold belt (AHFB) are few in number and scattered over large territory, two of them, the Elbrus and Kazbek neovolcanic centers, are worldwide known for their large-scale eruptions, sizes, and height of predominate volcanic edifices. According to recent studies [Chernyshev et al., 2008; etc.], the highest peak of Europe and Russia, Elbrus volcano (5642 m), is ascribed to the potentially hazardous volcanoes, with last eruptions presumably occurred in the Holocene. Kazbek volcano (5033 m), which not much more concedes to Elbrus on height, had a longer history. Although the eruptions of its main edifice presumably had already ceased in the beginning of Late Pleistocene (according to International chronostratigraphic chart, 2012), a series of small satellite cones were formed along its periphery in the Holocene. The activity of at least one of them (Lesser Tkarshehi) occurred as recently as 6 thousand years ago [Burchuladze, 1976; Chernyshev et al., 2002].

The discovery of potential volcanic hazard for the Greater Caucasus stimulated comprehensive geological, geophysical, petrological-geochemical, and isotope studies of magmatism that spanned this territory in the Neogene-Quaternary. Field works and subsequent isotope-geochemical studies made it possible to specify the areals of the youngest magmatism, and to supplement the previously known volcanoes with significant number of new Middle Pleistocene—Holocene edifices of different types.

A large volume of now available data on the volcanology of the Greater Caucasus allowed us to launch the systematization of obtained results and compiling the catalogue of known volcanoes for this region, including such key information as position and geomorphology of edifices, the predominant type of eruptions, and the main petrographic, geochemical, and geochronological characteristics of the products of magmatic activity. In this paper, the first attempt was made to integrate recent original data obtained by us in the last years and results of previous studies in such a catalogue (table).

In this relation, we should mention some eminent scientists (Soviet and Russian), who contributed much in the study of Quaternary magmatism of the Greater Cau-
# The Catalogue of the Quaternary Volcanoes of the Greater Caucasus

<table>
<thead>
<tr>
<th>Volcano, references</th>
<th>Coordinates (WGS 84)</th>
<th>Type, character of eruptions</th>
<th>Rocks</th>
<th>Chemical composition, wt %</th>
<th>Age, ka</th>
<th>Isotope data</th>
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<tbody>
<tr>
<td></td>
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<td>altitude, m</td>
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<td>SiO₂</td>
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<tr>
<td><strong>ELBRUS NEOVOLCANIC AREA</strong></td>
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<td><strong>Elbrus volcanic center</strong></td>
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<tr>
<td>Eastern group of the volcanoes</td>
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<tr>
<td>1. Syltran [1]</td>
<td>43.335527</td>
<td>42.673645</td>
<td>3539</td>
<td>P; 2</td>
<td>(Amf, Q, Bi)-Px-Pl dacites</td>
<td>65.6–68.4</td>
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<tr>
<td>2. Tashlysyrt [1]</td>
<td>43.518069</td>
<td>42.780089</td>
<td>2470</td>
<td>P; 2, 4</td>
<td>(Bi, Amf, Q)-Px-Pl dacites</td>
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<td>3. Tyzyl [1, 12]</td>
<td>43.593471</td>
<td>42.837211</td>
<td>2130</td>
<td>P; 3</td>
<td>cPx-Ol trachyandesites and basaltic trachyandesites</td>
<td>55.9–57.8</td>
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<td>Western group of the volcanoes</td>
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<td>4. Paleo-Elbrus [2, 10]</td>
<td>43.340574</td>
<td>42.394622</td>
<td>4623</td>
<td>P; 1, 9</td>
<td>(oPx)-Q-Bi-Pl rhyodacitic ignimbrites and tuffs, (Amf, oPx, Kfsp)-Bi-Q-Pl dacites</td>
<td>67.8–69.8</td>
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<tr>
<td>5. Unnamed [2]</td>
<td>43.338147</td>
<td>42.342088</td>
<td>3650</td>
<td>M; 7</td>
<td>oPx-Q-Bi-Pl rhyodacites,</td>
<td>65.9–72.6</td>
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<td>6. Unnamed [6]</td>
<td>43.322368</td>
<td>42.355104</td>
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<td>8. Homart-Kol [7]</td>
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<td>Rhyodacitic tuffs</td>
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<td>9. Chuchkhur [2]</td>
<td>43.470485</td>
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<td>oPx-Pl dacitic ignimbrites</td>
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<td>10. Tash-Tebe [2]</td>
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<td>11. Elbrus Western cone</td>
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<td>12. Elbrus Eastern cone [3, 10, 16]</td>
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<td>13. Kazbek (Mkinvartsveri) [5, 8, 10, 13]</td>
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**KAZBEK NEOVOLCANIC AREA**

**Kazbek volcanic center**

**Kazbek group of the volcanoes**

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<td>13. Kazbek (Mkinvartsveri) [5, 8, 10, 13]</td>
<td>42.697006</td>
<td>44.519185</td>
<td>5034</td>
<td>P; 8, 1</td>
<td>(Ol, cPx)-Amf-oPx-Pl basaltic trachyandesites, (cPx)-Amf-oPx-Pl andesites, (Bi, cPx)-oPx-Amf dacites</td>
<td>55.6–67.7</td>
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